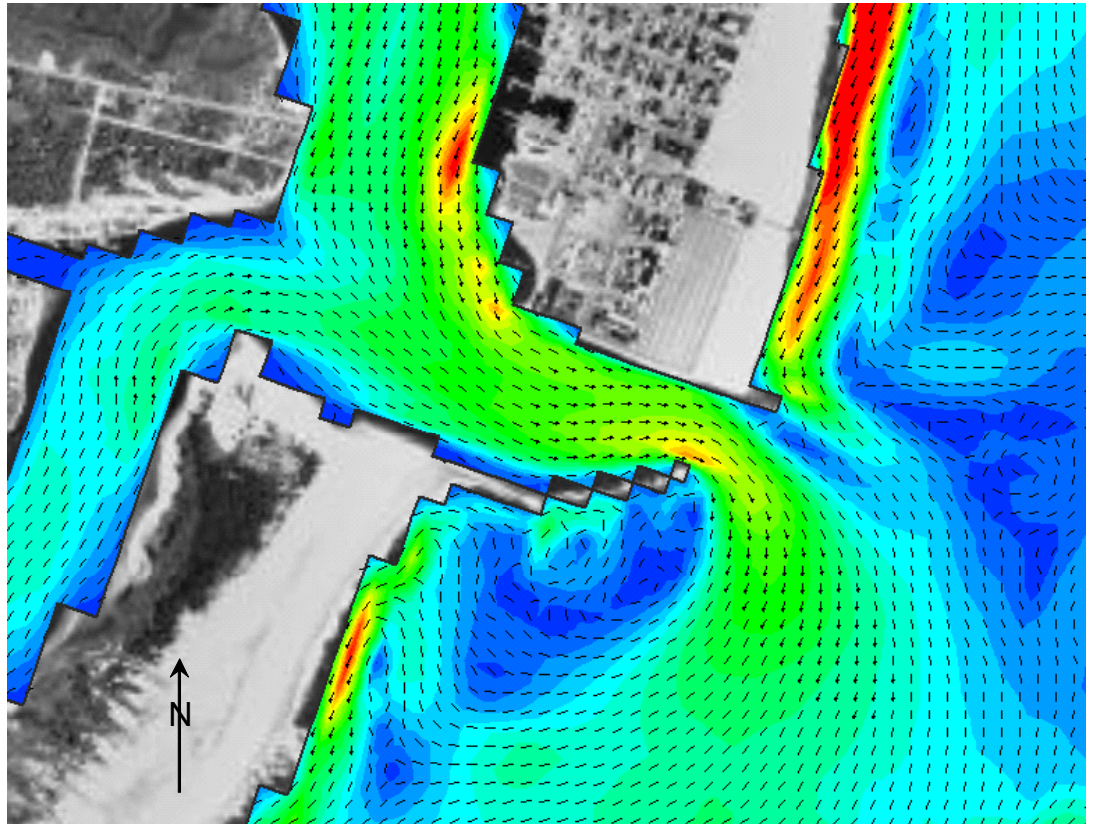




**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Inlet Modeling System



Inlet Modeling System application at Ocean City Inlet, Maryland

Description of Research

The Inlet Modeling System (IMS), a research area of the [Coastal Inlets Research Program](#) (CIRP) at ERDC's [Coastal and Hydraulics Laboratory](#), is a centralized location of major multidimensional models constituting an integrated numerical modeling system to simulate waves, currents, water level, sediment transport, and morphology change at inlets and entrances. Emphasis is on navigation channel performance and sediment exchanges between the inlet and adjacent beaches. IMS is verified with field and laboratory data and provided within a user-friendly interface running in the [Surface-Water Modeling System](#) (SMS).

Problem

Navigation projects involving coastal inlets are designed, operated, and maintained through complex morphologic features, which evolve with time ranging from short-term, as in response to storms, to slow, gradual change caused by waves and currents. Because the hydrodynamics, inlet morphology, navigation channel, and longshore sediment transport are connected, navigation project maintenance and natural processes must be estimated to minimize channel dredging and to promote sediment bypassing, either by natural processes or through dredging-related activities. Therefore, to meet the challenges of channel deepening nationwide and creation of new channels, quantitative predictive models must be available that can calculate navigation channel and morphology change

and connect the processes to the channels and adjacent beaches for evaluation of alternatives in a sediment-sharing system.

Expected Products

CIRP is developing a suite of models that constitute the IMS for calculating hydrodynamics, sediment transport, and morphology change at inlets with the typical time frame of a tidal cycle, through a series of storms, to several years. The technology is available for field use through the Surface-Water Modeling System (SMS) interface and annual training workshops.

Potential Users

IMS through CIRP is producing information and tools to support the U.S. Army Corps of Engineers, private industry, and academia in addressing engineering and science problems at coastal inlets nationwide.

Projected Benefits

Potential benefits and design capability stemming from this work unit include the following:

- Capability and guidance for modeling circulation and water-level changes in and around inlets and associated navigation channels and jetties
- Tools for analysis of natural and anthropogenic modifications to inlets, structures, shoals, and channels
- Realistic representation of a wide range of physical processes encountered in the Corps of Engineers projects, such as tide, wind stress, wave stress, river inflow, advection, flooding and drying, and storm surge
- Capability of integrating the calculation of waves, currents, and sediment transport for inlets, entrances, and navigation channels within a convenient (SMS) interface
- Capability of high-resolution calculations
- IMS and its component models are flexible and applicable to navigation, operation and maintenance, and other coastal engineering problems at inlets
- Example applications include developing the most efficient channel, optimizing channel reliability, optimizing advance dredging practice, prediction and reduction of channel shoaling, determining the best location for dredged-material placement, and objectively evaluating the alternatives for jetty modifications. IMS has been applied/tested at Shinnecock Inlet, NY; Ocean City, MD; Grays Harbor, WA; Willapa Bay, WA; Humboldt Bay, CA; and Ponce de Leon Inlet, FL

**ERDC Program
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**Participating ERDC
Laboratories**

Coastal and Hydraulics Laboratory (CHL)